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21 Psychological aspects of diabetes

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Psychological factors are highly relevant to much of diabetes management but although recently funds have been made available to encourage research into applications of psychology to diabetes management the importance of integrating psychology and medicine has not yet been fully recognized. In 1983, the organizers of the American Diabetes Association asked for abstract submissions from psychologists and other non-medical practitioners. Conference planning, however, separated the psychology from the medicine. Presentations concerned with medical aspects of continuous subcutaneous insulin infusion (CSII), and those dealing with psychosocial aspects of CSII took place at the same time and precluded attendance at both sessions. This lack of appreciation of the importance of interdisciplinary understanding has been noted by other reviewers (1–3)..

Recent research developments

In the last 2 years there have been 2 major developments in diabetes-related psychological research: (1) a change of focus away from the unproductive search for the 'diabetic personality' towards greater appreciation of individual differences in beliefs about diabetes; (2) a recognition of the need to evaluate the potential of new technology such as blood glucose monitoring, CSII and newly developed biochemical measures, not only for glycemic control but also for patients' quality of life and general well-being.

Individual differences in beliefs about diabetes and styles of management

The study of attributions is a developing area of psychology which offers a potentially useful framework for understanding motivation – a major concern in diabetes research. Attribution theories are concerned with the attributions or explanations people use to account for events. Attributions

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may be seen to vary along an important dimension from internal (or dispositional) to external (or situational) attributions. Explanations in terms of personality factors or lack of effort are examples of internal attributions which might be used to account for an event such as a period of fluctuating blood glucose levels, but such an event might also be attributed to external factors such as family problems or inappropriate insulin regimen.

Attribution theorists have observed various consistencies in the kinds of attribution made under particular circumstances. The 'actor–observer bias' (4) refers to the tendency for people to differ in their explanations for each other's behavior: 'actors' tend to attribute their own behavior more to situational factors while 'observers' tend to attribute the behavior of actors to those actors' personal dispositions or characteristics. It appears that the lengthy, unproductive search for the 'diabetic personality' is an example of such an attribution bias; researchers and clinicians have overemphasized patients' characteristics such as obsessionality, hypochondriasis, and lack of intelligence in explaining patients' difficulties with diabetes management at the expense of situational explanations which are more likely to be considered by the patient. Recently Skyler (3), Dunn and Turtle (5) and other authors (1, 2, 6–8) have attempted to steer the search for explanations away from the 'myth of the diabetic personality'.

The attributions chosen to explain a person's past successes and failures have important consequences for that person's motives to perform in future. At least 2 further dimensions of attributions have been shown to be important: stable–unstable and controllable–uncontrollable (9). If an individual's performance is attributed to stable personality characteristics, similar performance can be anticipated in future. Unstable attributions to temporary mood states can offer no prediction of future performance. Attributions to luck imply no personal control over similar events in the future, whereas attributions to effort lead to expectations of control over future events.

Although the focus of studies concerned with perceptions of control has so far remained firmly on the patients, attributions, unlike personality characteristics, are more susceptible to environmental influence. Education programs and consultation styles may be designed to facilitate constructive attributions and health beliefs (10). However, there is a need to understand not only the attributions of patients but also those of their advisers. Constructive consultations are more likely to occur when doctors and patients become aware of each other's attributions and can resolve any differences between them.

Commonly used methods of measurement of some aspects of attributions are locus of control measures. The concept of locus of control originated from the work of Rotter (11), who developed a scale to measure generalized expectations of control over outcomes. The Rotter Scale provides a score on a dimension ranging from internal locus of control, where the individual

individual will follow prescribed treatment: beliefs about (1) the benefits of treatment, (2) the barriers to treatment, (3) the severity of the disorder, and (4) vulnerability to the disorder.

Several studies of diabetic patients have employed versions of health belief scales and, although some of the results look promising, support for their hypotheses has been limited and inconsistent (14, 21–24). Most of the studies have modified general health belief scales for use with diabetic individuals, but none has presented data on the reliability of the scales and few have provided sufficient detail about scale contents to allow judgments of face validity. When the measures failed to predict response to treatment, therefore, it was not possible to tell whether the measures were irrelevant or whether they were inadequate for the purpose of the study. Two research groups (18, 25) have recently reported the psychometric properties of diabetes-specific health belief scales allowing for clearer interpretation of future research findings based on scales of known reliability.

It is perhaps not surprising in the light of the actor–observer bias that little attention has been given to the variability and influence of the beliefs of doctors, nurses and other health professionals although a great many studies have been concerned with patients' beliefs.

One study which has examined doctors' beliefs about some aspects of diabetes management is described by Marteau and Baum (26), who compared the beliefs of 104 pediatricians and 119 physicians dealing with adult patients, all of whom were actively involved with diabetes management. Pediatricians underestimated the morbidity and mortality after 30 years of juvenile onset diabetes compared with physicians whose estimates more closely corresponded with the available data. The two groups of doctors differed in their opinions of the optimal target blood glucose levels for children with diabetes: more pediatricians opted for higher values. If pediatricians are unrealistically optimistic about the risks of diabetes and less convinced of a relationship between hyperglycemia and diabetes-related complications, it is likely that their patients' health beliefs and glycemic control will be affected. A combination of correlational and intervention studies would be required to establish the causal relationships between the range of health beliefs of doctors and patients and treatment recommended or followed.

Psychological effects of new techniques in diabetes management

Biochemical developments: C-peptide and GHb measures The use of C-peptide measures of endogenous insulin availability (27) and determination of clinical criteria which may be used in the absence of C-peptide measures for the identification of Type 1 and Type 2 diabetes (28) have important implications for psychophysiological studies of diabetes management. Re-

HBGM performed by researchers themselves or by laboratory staff have indicated other possible explanations for the sources of error, including variable accuracy of the HBGM methods dependent on the range of BG measured (35, 37). Both patient error and technological error may be contributing to observed errors of measurement and both possibilities should be considered in designing and developing HBGM equipment to maximize accuracy and usability (37). It is also important that the limitations of HBGM methods currently in use be recognized in order to ensure appropriate attributions and to allow for effective interventions to reduce or adjust for measurement error.

Essential to the learning and maintenance of any skill is accurate and preferably immediate feedback about performance. Blood glucose monitoring, while offering more accurate and more immediate feedback of blood glucose levels than does urine glucose monitoring, still appears to fall short of ideal as a form of feedback for improving diabetes control. Even if patients can tolerate the inconvenience of multiple daily blood glucose determinations, hypoglycemia may occur without warning and episodes of hyperglycemia may go undetected. It has been suggested (38, 39) that if patients could learn to detect blood glucose levels outside the normoglycemic range, blood testing might be more effectively and economically used to confirm the occurrence of unacceptable fluctuations and allow adjustments to be made. Despite the traditional assumption that all but the most extreme blood glucose levels are asymptomatic, Pennebaker et al. (40) and Cox et al. (41) have demonstrated that 80% of their sample of 30 insulin-requiring adult patients could identify at least one physical symptom which correlated strongly with blood glucose levels. The glucose-related symptoms differed from subject to subject: 9 of the 19 symptoms used in their checklist were associated with high blood glucose for some subjects and with low blood glucose for other subjects.

Feedback has been used to improve detection of various visceral events including heart rate (42), blood pressure (43) and blood alcohol levels (44). A recent report by Gross and colleagues (45) demonstrated that the accuracy of 3 patients in subjective estimation of blood glucose levels was significantly improved during a period of 8–11 days of feedback from measured blood glucose. Although improvements in accuracy were not maintained when feedback was withdrawn, blood glucose levels tended to be lower during periods of feedback. The sample was small and the effects of these changes in blood glucose control on accuracy of estimation were not systematically examined.

The possibilities of training subjects to estimate their blood glucose levels by attending to cues from physical symptoms (46) or from mood states (47) are now being examined.

tic subjects but by only 11% of their non-diabetic siblings. Further investigation of such relationships may contribute to the understanding of the etiology of Type 1 diabetes.

The effects of stress on diabetes control Surwit and colleagues (6, 7) have provided useful summaries of the role of the autonomic nervous system in the regulation of carbohydrate metabolism. Although life event research has produced consistent evidence for an association between experiences commonly considered stressful and increases in blood glucose levels (29, 30, 58, 59), the direction of blood glucose change with short-term laboratory stressors has varied between studies. Reviews of this literature (1, 39, 60) concluded that the stressors used had destabilizing effects on diabetes control but that the direction of blood glucose change was not consistent. These studies of acute stressors and metabolism have been criticized on a variety of methodological and conceptual grounds (39, 56, 60, 61). It is now recognized (62) that the assumption that all stressors will have similar physiological effects in healthy subjects is untenable and that the actual and perceived demands on the individual and the individual's actual and perceived ability to cope are important in determining psychophysiological responses. Few of the studies of diabetic individuals established that the supposed stressor was indeed experienced as stressful and some made no attempt to control for the type of diabetes. Future studies may benefit from the availability of C-peptide measures in selecting groups of subjects and from recognizing that the availability of exogenous insulin during experimental sessions will influence the extent and duration of apparent blood glucose changes. Furthermore, consideration of the effects of autonomic neuropathy might well clarify the findings of future studies.

A recent report by Turkat (63) has offered a further method of examining the relationship between stress and diabetes control. Rather than measuring life events or responses to laboratory stressors, Turkat related levels of anxiety (assessed by interview) to GHb levels. In his small sample of patients (16 Type 1 and 1 Type 2), those categorized as high in anxiety had higher GHb levels than patients with moderate or low anxiety. The latter 2 groups did not differ in GHb. This study did not control for between-group differences in sex and the duration of diabetes, and the need for replication of these findings was recognized. Turkat pointed out that while stress management may be appropriate for some patients, it could not be expected to improve diabetes control in people who were not previously anxious.

Stress management Several authors have employed relaxation techniques as a possible means of reducing stress-induced hyperglycemia. Two detailed case reports (64, 65) have demonstrated that insulin requirements were reduced by relaxation training with electromyographic (EMG) biofeed-

primary impotence and the 9 with secondary impotence, 3 patients had received some limited sexual counselling and that these 3 patients had themselves initiated discussion of impotence and actively sought help. Generally, patients were given no information about impotence and no anticipatory warnings. Smith concluded that the need for sexual counseling for diabetic men was apparent but that adequate help was rarely provided.

Behavioral approaches to enhancing patient self-care Knowledge is a necessary but not a sufficient condition for achieving good diabetes control. Wide discrepancies have been found between the knowledge and behavior of diabetic patients (31) and between knowledge and diabetes control (74). Surwit and colleagues (6, 7) have summarized some of the behavioral strategies that have been used successfully in increasing a variety of self-care behaviors. Some of these strategies are already used routinely in diabetes education programs, e.g. *self-monitoring* behaviors relevant to treatment and *skill training* of new behaviors. Others are rarely used systematically, e.g. *shaping* successive approximations of the desired treatment regimen rather than requiring the patient immediately to adopt a complex new behavior pattern, *contracting* between patient and therapist for desired behavior change, and *reinforcement* of new desired behaviors.

Behavioral approaches have focused on increasing specific self-care behaviors. For instance, a series of studies by Epstein and colleagues demonstrated the use of such approaches in improving both the accuracy in urine glucose determinations by children with diabetes (75) and the percentage of negative urine glucose tests (76). Carney (77) reported improvements in the frequency of blood glucose monitoring. Other behavioral approaches investigating the possibilities of maximizing the value of blood glucose self-monitoring are discussed on page 378. Fisher and colleagues (1) have reviewed a number of studies which successfully used behavioral approaches for dietary regulation and weight loss to which may be added a recent study by Wing (78). Wing found that overweight Type 2 diabetic patients who were assigned to a behavioral weight control program lost significantly more weight than those assigned to nutrition education or a standard care condition. A recent study of the use of sex therapy with men diagnosed as having organic impotence indicated that sexual functioning was improved for 60% of these individuals (79).

Conclusions

Research into psychological aspects of diabetes and the use of psychological approaches in diabetes management is at an early stage. The potential contribution of psychology is gradually being recognized but although progress has been made, psychological methods and approaches are not yet

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